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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/047,161	01/14/2002	George P. Moeckel	DR9815	4355

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EXAMINER	
GEBRESILASSIE, KIBROM K	
ART UNIT	**PAPER NUMBER**
2128	

DATE MAILED: 12/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/047,161	MOECKEL ET AL.	
	Examiner	Art Unit	
	Kibrom K. Gebresilassie	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 January 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *04/24/02&07/09/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This action is responsive to the application filed on 14 January 2002

2. Claims 1-17 have been examined and rejected.

Priority

3. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. And therefore, the priority filing date for this application is 17 January 2001.

Information Disclosure Statement

4. The Office acknowledges receipt of the Information Disclosure Statements filed on 24 April 2002 and 09 July 2002. They have been placed in the application file and the information referred to therein has been considered.

Oath/Declaration

5. The Office acknowledges receipt of a properly signed oath/declaration filed on 12 April 2002.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claims 11-17 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. *The Examiner submits that Applicant's have not recited any limitations relating to a practical application in the technological arts and have merely claimed intangible media. Section 2106 [R-2] (Patentable Subject Matter - Computer-Related Inventions) of the MPEP recites the following:*

"In practical terms, claims define nonstatutory processes if they:
- consist solely of mathematical operations without some claimed practical application (i.e., executing a "mathematical algorithm"); or
*- **simply manipulate abstract ideas**, e.g., a bid (Schrader, 22 F.3d at 293-94, 30 USPQ2d at 1458-59) or a bubble hierarchy (Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759), **without some claimed practical application**."*

*An invention which is eligible for patenting under 35 U.S.C. § 101 is in the "useful arts" when it is a machine, manufacture, process or composition of matter, which produces a concrete, tangible, and useful result. The fundamental test for patent eligibility is thus to determine whether the claimed invention produces a "**useful, concrete and tangible result.**" The test for practical application as applied by the examiner involves the determination of the following factors:*

(1) "Useful" - The Supreme Court in Diamond v. Diehr requires that the examiner look at the claimed invention as a whole and compare any asserted utility with the claimed invention to determine whether the asserted utility is accomplished.

(2) "Tangible" - Applying In re Warmerdam, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994), the examiner will determine whether there is simply a mathematical construct claimed, such as a disembodied data structure and method of making it. If so, the claim involves no more than a manipulation of an abstract idea and therefore, is nonstatutory under 35 U.S.C. § 101. In Warmerdam the abstract idea of a data structure became capable of producing a useful result when it was fixed in a tangible medium which enabled its functionality to be realized.

(3) "Concrete" - Another consideration is whether the invention produces a "concrete" result. Usually, this question arises when a result cannot be assured. An appropriate rejection under 35 U.S.C. § 101 should be accompanied by a lack of enablement rejection, because the invention cannot operate as intended without undue experimentation.

The Examiner respectfully submits, under current PTO practice, that the claimed invention does not recite either a useful, concrete, or tangible result and is merely drawn to a manipulation of abstract ideas.

- *Claims 11-17 are including intangible media "carrier medium" which incapable of being touched or perceived absent the tangible medium.*

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1-17 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6.108,608 issued to Watts et al.

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

As per Claim 1:

Watts discloses a method of estimating one or more properties of a multi-component fluid contained in a physical system containing two or more phases (abstract), comprising the steps of: (a) equating the physical system in at least one dimension to a multiplicity of cells

(Abstract lines 6-9); (b) for each cell, characterizing the multi-component fluid in the cell using a property of a first set of components and representing the characterization by a first vector (Abstract lines 14-18); (c) converting the first vector to a second vector using a transformation matrix, the transformation matrix being indicative of the distribution of the first set of components and the second vector being representative of a property of a second set of components greater in number than the first set of components (col. 15 lines 24-29); (d) using the second vector to determine the number and properties of phases present in each cell (col. 9 lines 52-54); (e) determining the elements of a first matrix that expresses distribution of the second vectors among the phases (col. 15 lines 6-7); (f) determining the elements of a second matrix that expresses how the first vectors are distributed among the phases using the transformation matrix and the first matrix (col. 15 lines 24-29); (g) determining a third matrix that expresses the composition of the phases in terms of the first vectors (Abstract lines 10-18); and (h) using the third matrix to perform fluid flow calculations to estimate one or more properties of the multi-component fluid (abstract lines 1-5).

As per Claim 2:

Watts discloses a method for simulating fluid movement and phase change behavior, wherein the method comprises: (a) determining for each of a plurality of discrete cells a vector of first domain component concentrations (col. 10 lines 39-45); (b) transforming the first domain component vectors into vectors of second domain component concentrations (col. 15 lines 24-29); (c) applying to the second domain component vectors, equations of state to determine second domain component distribution matrices indicative of a distribution of the second domain components among each of the phases (col. 1 lines 61-67); (d) converting the second domain component distribution matrices to first domain component distribution matrices (col. 13 lines 56-62); and (e) applying the first domain component distribution matrices to fluid flow equations

to determine for each of the plurality of discrete cells an updated vector of first domain component concentrations(abstract lines 1-5).

As per Claim 3:

Watts discloses the method of claim 2, wherein the converting includes multiplying the second domain component distribution matrix with a transform matrix (Table E9).

As per Claim 4:

Watts discloses the method of claim 2, further comprising: displaying the concentrations of a desired component in a given cell at a given time (col. 2 lines 6-8).

As per Claim 5:

Watts discloses a nonlinear process simulator which comprises: (a) a display monitor; (b) a processor coupled to the display monitor and configured to display time evolution of the process; and (c) a memory configured to store software for access by the processor, wherein the software includes: a second domain module which configures the processor to determine a distribution of second domain components among a plurality of phases, wherein the second domain component distribution is expressible in terms of a second domain component distribution matrix having elements that specify what fraction of each second domain component is found in a given phase (col. 8 lines 12-22); and a conversion module which configures the processor to convert the second domain component distribution matrix into a first domain component distribution matrix by multiplying the second domain component distribution matrix with a transform matrix to obtain a first domain component distribution matrix, wherein the second domain components are expressible as a product of the first domain components and the transform matrix (col. 2 lines 45-52).

Watts fails expressly to disclose (a) a display monitor; (b) a processor coupled to the display monitor and configured to display time evolution of the process; and (c) a memory configured to store software for access by the processor

Watts fails expressly to disclose (a) a display monitor; (b) a processor coupled to the display monitor and configured to display time evolution of the process; and (c) a memory configured to store software for access by the processor. However, those feature are, (a) a display monitor; (b) a processor coupled to the display monitor and configured to display time evolution of the process; and (c) a memory configured to store software for access by the processor, deemed to be inherent to the Watts system in col. 18 lines 29-37. Without having a monitor, a processor and a memory, it could be impossible to calculate a large number of iteration, to store data's, and to display results. Therefore, the system of Watts would be inoperative without display monitor, processor and memory.

As per Claim 6:

Watts discloses the simulator of claim 5 wherein the software further includes: (a) a first domain module which configures the processor to determine for each of a plurality of discrete cells a vector of first domain component concentrations (col. 10 lines 39-45); (b) a transform module which configures the processor to transform the first domain component concentration vectors into second domain component concentration vectors, wherein the second domain module operates on the second domain component concentration vectors to determine the second domain component distribution matrix (col. 15 lines 24-29) .

As per Claim 7:

The limitation of claim 7 has already been discussed in the rejection of claim 4. It is therefore rejected under the same rationale.

As per Claim 8:

Watts discloses the simulator of claim 6, wherein the first domain module performs simulation of fluid flow (col. 1 lines 34-38), and the second domain module performs simulation of fluid phase behavior (col. 1 lines 39-53).

As per Claim 9:

Watts discloses the simulator of claim 8, wherein the software configures the processor to simulate development of petroleum reservoirs by repetition of actions that include simulating fluid flow in the first domain, transforming first domain component concentrations into second domain component concentrations, simulating fluid phase behavior in the second domain, and converting the second domain component distribution matrix into the first domain component distribution matrix (col. 15 lines 24-29).

As per Claim 10:

The limitation of claim 10 has already been discussed in the rejection of claim 9. It is therefore rejected under the same rationale.

As per Claim 11:

Watts discloses an information carrier medium configured to provide a processor with a program, wherein when the processor executes the program the processor is configured to: (a) determine a distribution of second domain components among a plurality of phases, wherein the distribution is expressible as a second domain component distribution matrix having elements that specify what fraction of each second domain component has a given phase (col. 8 lines 12-22); and (b) convert the distribution of second domain components among the phases to a distribution of first domain components among the phases, wherein the second domain components are expressible as a product of the first domain components and a transform matrix, and wherein the conversion of the distribution includes multiplying the second domain component distribution matrix with the transform matrix to obtain a first domain component

distribution matrix (col. 15 lines 24-30).

As per Claim 12:

Watts discloses the carrier medium of claim 11, wherein the carrier medium is a computer-readable information storage medium (col. 18 lines 31-33).

As per Claim 13:

Watts discloses the carrier medium of claim 11, wherein the carrier medium is an information transmission medium (col. 18 lines 34-37).

As per Claim 14:

Watts discloses the carrier medium of claim 11, wherein the program further configures the processor to: (a) evaluate equations expressed in terms of a first domain to determine first domain component values (col. 9 lines 54-55); (b) transform the first domain component values into second domain component values (col. 15 lines 24-29); and (c) evaluate equations expressed in terms of a second domain to determine the distribution of second domain components (col. 15 lines 6-7).

As per Claim 15:

Watts discloses the carrier medium of claim 14, wherein the first domain equations include fluid flow continuity equations, and wherein the second domain equations include phase equilibrium and flash equations (col. 1 lines 55-58).

As per Claim 16:

The limitation of claim 16 has already been discussed in the rejection of claim 9. It is therefore rejected under the same rationale.

As per Claim 17:

The limitation of claim 17 has already been discussed in the rejection of claim 10. It is therefore rejected under the same rationale.

Conclusion

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Dougherty, E. L. "Mathematical Model of Unstable Miscible Displacement", SPEJ, pp 155-163, June 1988.

Gardner, J.W., Orr, F.M, and Patel, P.D. "The Effect of Phase Behavior on CO2 Flood Displacement Efficiency", JPT, pp 2067-2081, November 1981.

Nghiem, L.X., and Li, Y.K. "Phase-Equilibrium Calculations for Reservoir Engineering and Compositional Simulation", Reservoir simulation, Aplbach, Austria, September 12-16, 1988.

U.S. Patent No. 5,801,969 issued to Nagahama et al.

U.S. Patent No. 6,810,370 issued to Watts et al.

2. Any inquiring concerning this communication or earlier communication from the examiner should be directed to Kibrom K. Gebresilassie whose telephone number is (571) 272-8571. The examiner can normally be reached on Monday-Friday, 8:30 am to 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner supervisor, Kamini shah can be reached at (571) 272-2279. The official fax number is (571) 273-8300. Any inquiring of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is (571) 272-3700.

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